

AMENDMENT TO THE DRAWINGS

Amendment to Figs. 18, 22, 25, 26, 28, 31 and 32 are enclosed.

REMARKS

Reconsideration of the application is respectfully requested.

I. Status of the Claims

Claims 1, 5, and 9 are amended. No new matter is added.

Claims 13-15 are new. Now new matter is added.

Claims 2-4, 7, and 10-12 are cancelled.

Claims 1, 5, 6, 8, 9, and 13-15 are pending.

II. Amendment to the Drawings

Objection under 37 CFR §1.83(a)

The objection to the drawings by the Examiner is noted. Amendment to Figs. 18, 22, 25, 26, 28, 31 and 32 are enclosed. In the Replacement sheets enclosed herewith, Figures 31 and 32 are designated by the legend -- Prior Art -- . Referring to the radius of curvature "r", diameter "D" and web thickness "d", reference symbols "d" and "D" are shown in Fig. 21 and reference symbol "r" is described as "radius of curvature 'r' of substantially arc-shaped portions formed by the corner cutting edge" in the specification. The references symbol "r" is being added to Figs. 18, 22, 25, 26, and 28. No new matter is added. Applicants respectfully request the objections be withdrawn.

III. Rejection under 35 U.S.C. §112

The rejection of claims 7 and 8 under 35 U.S.C. §112, second paragraph, as being indefinite because symbols “r”, “D”, and “d” are not shown in the Drawings is traversed.

The symbols “d” and “D” are illustrated in Fig. 21 and the symbol “r” is described in the specification and further added to Figs. 18, 22, 25, 26 and 28. Claim 7 has been cancelled, rendering the rejection moot. Applicants respectfully request the rejection be withdrawn.

IV. Rejections under 35 U.S.C. § 102

The rejection of claims 5, and 6 under 35 U.S.C. § 102(b) as being anticipated by Yamada (JP 2000000716A) is traversed.

According to amended Claim 5 and new claim 13, since the corner cutting edges are large with respect to the diameter and the web thickness of the tool body, it is possible to form the gashes having a sufficient size so that superior chip discharge performance can be obtained (e.g., See Specification page 37, lines 9 to 23). Furthermore, since the rake faces of the corner cutting edges and the rake faces of the end cutting edges are formed as a smoothly continuous curved surface, the cutting edge including the end cutting edge, the corner cutting edge, and the peripheral cutting edge can be formed precisely. Therefore, a precision tool can be obtained.

Yamada discloses a radius end mill in which a rake face of an end cutting edge and a rake face of a corner cutting edge are formed as a single, smoothly continuous convex curve surface.

However, regarding the radius of curvature “r” of corner cutting edges, and the web thickness “d” and the diameter D of the tool body, Yamada does not disclose or suggest the dimension “d” and the ratio of r/D. Yamada describes that the size of an end mill is “18xR3” (18 is the diameter, and R3 is the radius of curvature of a corner portion). Tools having the dimensions as in amended claim 5 or other different dimensions are not described in Yamada. Furthermore, it is not disclosed or suggested in the cited reference to set the dimensions of the tools as recited in the amended claim 5.

Therefore, independent claims 5 and 13 and the dependent claims 6, 8, 14, and 15 are not anticipated by Yamada. Applicants respectfully request the rejection be withdrawn.

V. Rejections under 35 U.S.C. § 103

The rejection of claims 1, and 9 under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent Publication 6-218616 ("JP '616"), in view of Reynolds et al. (U.S.Pat. No. 5,855,458) is traversed.

Reynolds et al. discloses that the secondary gash 10 (i.e., a sub gash face) is formed at proximal end of the first gash face 8 (i.e., a main gash face), not at the outer periphery of the first gash face 8. That is, the corner cutting edge is not formed at the secondary gash 10. In addition, as shown in Reynolds Fig. 2, the surface is arranged radially more outside than the first gash face 8 and the secondary gash 10 is not formed via a step portion with respect to the first gash face 8 and the secondary gash 10, even though there is no specific description.

The step portions now recited in amended claims 1 and 9 are formed as flat walls perpendicular to the main gash face 17 as show in Fig. 4, and also perpendicular to the sub gash face 18 (e.g., page 13, lines 11 to 20). This structure is not disclosed in JP '616.

According to the amended claims 1 and 9, the ability to discharge the chips can be improved by shifting the discharge direction of the chips using the step portions which are perpendicular to the main gash face and sub gash face. Applicants respectfully submit that JP '616 and Reynolds do not, either alone or in combination, teach or suggest all of the elements of claims 1 and 9. Applicants request the rejection be withdrawn.

VI. Rejection under 35 U.S.C. §103(a)

The rejection of claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Yamada (JP 2000000716A) is traversed. Claim 8 depends from claim 5 and, therefore, for the reasons noted above regarding claim 5, it is our understanding that claim 8 avoids Yamada. Applicants request the rejection be withdrawn.

CONCLUSION

In view of the above, each of the presently pending independent Claims 1, 5, 9, and 13, and dependent Claims 6, 8, 14, and 15 in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

The Examiner is respectfully requested to contact the undersigned at the telephone number indicated below if the Examiner believes any issue can be resolved through either a Supplemental Response or an Examiner's Amendment.

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Respectfully submitted,

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